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EXAMINER

YEH, EDITH M

ART UNIT /

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/549,559

Applicant(s)

CEDERVALL ET AL.

Examiner

Edith M Yeh

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 14 April 2000.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-29 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-14 and 20-29 is/are rejected.
- 7) ☒ Claim(s) 15-19 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 5.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Claim Objections

1. Claim 6 is objected to because of the following informalities: the term “the mathematical algorithm” is not clear to indicate which or what “mathematical algorithm” in the claim and its parent claims. It is suggested to change the term to “the equation” or “the equalization method” which are as antecedences in its parent claim 3, or change the “Method of claim 3” to “Method of claim 4” wherein the “a mathematical algorithm for the estimation” as the antecedence of this term. Appropriate correction is required.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1-5, 8, 12-14, 20-27 are rejected under 35 U.S.C. 102(b) as being anticipated by Gardner et al. (US Patent 5848105).

Regarding **claims 1 & 24**, Gardner et al. discloses the system and its method of rejection of noise and interference from a received combination signal by estimation of the desired signal having in addition to noise and interference been distorted by a communication channel through which the modulated transmitted desired signal has been passed (Abstract; FIG.22), comprising the means and steps: a) receiving a signal as a combination of noise, interference and the

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distorted desired signal through one or more antennas (Abstract, column 4 lines 45-50); b) separating the received signal into a real and an imaginary part (column 13 lines 5-15; FIG.8-10); c) modeling the noise and interference component as a filtered process (column 4 lines 60-65, column 5 lines 35-40, column 17 lines 20-40; FIG. 24); d) forming an equation for the received signal as a function of the desired signal distorted by the communication channel and the noise and interference component by utilizing the signal structure obtained in steps b) and c) (column 18 lines 22-60); e) selecting of values for the filter parameters in the equation (column 19 lines 1-10); and f) estimating the desired signal by calculation from the equation by means of the filter parameters selected in the foregoing step (column 19 lines 12-20).

Regarding **claims 2 & 25**, Gardner et al. discloses the means and its method of modeling the channel as a linear filter coefficient in the equation (column 9 lines 30-40, column 11 lines 55-60, column 12 lines 34-40).

Regarding **claim 3**, Gardner et al. discloses the method, the filter parameters and channel coefficient are calculated by means of a known training sequence from the equation formed in step d) by knowledge of the data sent by the signal in the training sequence (column 5 lines 41-54, column 18 lines 15-20, column 22 lines 20-33) and by knowledge of the statistical properties of the noise component (column 11 lines 25-33), whereafter the desired signal is estimated mathematically by means of an equalization method.

Regarding **claim 8**, Gardner et al. discloses the method is repeated for each received symbol sequence (column 18 lines 25-30; FIG.20-22).

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Regarding **claim 12**, Gardner et al. discloses the received signal has been linearly modulated (column 18 lines 15-16, lines 22-25; 50 FIG.23, the first path 60 FIG.25) wherein the linearly modulated received signal can be handled.

Regarding **claims 13 & 14**, Gardner et al. discloses the received signal has been non-linearly modulated (Abstract GMSK or MSK signal), whereby after step a), the signal is de-rotated (64 FIG.25).

Regarding **claims 20 & 21**, Gardner et al. discloses the prefiltering is used before the filter process (column 5 lines 5-13) wherein the over sampling to decrease the time spread of the channel.

Regarding **claim 22**, Gardner et al. discloses in the linearly modulated systems, the information of the filter is taken into consideration in the demodulation process (column 12 lines 25-30).

Regarding **claim 23**, Gardner et al. discloses the performance of the receiver is improved by decision direction, whereby the decisions of the received symbols is used in a re-estimating of the same (column 22 lines 20-32).

Regarding **claims 4 & 26-27**, Gardner et al. discloses the method and means further to carry out the equalization by means of a sequence estimator using a mathematical algorithm for the estimation wherein the sequence estimator calculates/estimates the desired signal from the equation by using the filter parameters (column 17 lines 19-40).

Regarding **claim 5**, Gardner et al. discloses the number of the parameters is selected by an order estimation procedure (column 18 lines 23-30).

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Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 6 & 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gardner et al. (US Patent 5848105) in view of Liang et al. (US Patent 6314147 B1).

Regarding **claim 6**, Gardner et al. discloses the maximum likelihood method (MLSE), however does not further detail the method. Liang et al. teaches the MLSE whereby the value for the received signal giving the least error can be obtained without being forced to calculate the received signal for difference values of the desired signal (column 2 lines 50-57). At the time of the invention, it would have been obvious to a person of ordinary skill in the art to have the Liang et al.'s teaching in the Gardner et al.'s method/system to detail and improve the processing of a received signal (column 3 lines 33-36).

Regarding **claim 7**, Gardner et al. does not further detail the selecting the least of the error values of the received signal. However Liang et al. teaches the received signal is recreated by means of the channel estimate and the filter parameters and different values for the desired signal (100 FIG.2; column 3 lines 50-60), the recreated value of the received signal is compared with the true value for the received signal to obtain error values for the received signal, estimating the desired signal by selecting the one giving the least error for the received signal (column 9 lines 13-28). At the time of the invention, it would have been obvious to a person of

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ordinary skill in the art to have the Liang et al.'s teaching in the Gardner et al.'s method/system to detail and improve the processing of a received signal (column 3 lines 33-36).

6. Claims 9-11, & 28-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gardner et al. (US Patent 5848105) in view of Polydoros et al. (US Patent 5432821).

Regarding **claims 9-10, & 28-29** Gardner et al. does not specify the AR filter process to model the noise and interference. However Polydoros et al. teaches the AR filter process, the method and means, (column 4 lines 35-41, column 12 line 60 (sec. 4.3) –columns 13 & 14) in a simple algorithm (column 13 lines 58-65). At the time of the invention, it would have been obvious to a person of ordinary skill in the art to have the AR filter process or the ARX model to model the ISI channel (column 4 lines 36-41, column 10 lines 32-36).

Regarding **claim 11**, inhering the limitations of claim 9, further Polydoros et al. discloses that the number of filter parameters to be taken into consideration in the AR process are estimated adaptively by means of known algorithms (column 13 lines 43-45). At the time of the invention, it would have been obvious to a person of ordinary skill in the art to have the AR filter process or the ARX model to model the ISI channel (column 4 lines 36-41, column 10 lines 32-36).

Allowable Subject Matter

7. Claims 15-19 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

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Conclusion

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Edith M Yeh whose telephone number is 703-305-3416. The examiner can normally be reached on M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephen Chin can be reached on 703-305-4714. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9314 for regular communications and 703-872-9314 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-305-4800.

Edith Yeh
June 26, 2003



STEPHEN CHIN
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